

WHAT IS CLAIMED IS:

- 1 1. A seat belt device for protecting the occupant of a vehicle comprising:
 - 2 a tongue fitting having an eyelet formed therein, said tongue fitting adapted to
 - 3 be received by a seat belt buckle attached to said vehicle;
 - 4 a seat belt retractor attached to said vehicle;
 - 5 a seat belt comprising a flexible fabric tube having a first end attached to said
 - 6 vehicle, a second end attached to said seat belt retractor, and a medial portion passing
 - 7 through said eyelet formed in said tongue fitting, said seat belt forming a three point
 - 8 restraint including a lap portion extending from said fixed end to said tongue fitting
 - 9 and a torso portion extending from said tongue portion toward said seat belt retractor;
 - 10 an inflatable air bag member disposed within said seat belt, said inflatable air
 - 11 bag member extending within said seat belt from a first end proximal said fixed of said
 - 12 seat belt end to a second end within said torso portion of said seat belt;
 - 13 a reinforcing sleeve, said reinforcing sleeve comprising a flexible fabric sleeve
 - 14 having a closed end and an open end, said reinforcing sleeve forming an annular layer
 - 15 between said inflatable air bag member and said flexible fabric sleeve, said reinforcing
 - 16 sleeve extending from said closed end proximal said first end of said inflatable air bag
 - 17 member to said open end within said torso portion of said seat belt; and
 - 18 an inflator fluidly connected with said inflatable air bag member for providing
 - 19 a source of pressurized gas for inflating said inflatable air bag member.

- 1 2. The seat belt device of claim 1, wherein:

2 said flexible fabric tube includes a longitudinal seam adapted to rupture as said
3 inflatable air bag member inflates.

1 3. The seat belt device of claim 1, wherein:

2 said reinforcing sleeve comprises a stress concentration at said open end, said stress
3 concentration being capable of initiating a tear in said reinforcing sleeve that propagates
4 toward said eyelet as said inflatable air bag is inflated.

1 4. The seat belt device of claim 3, wherein:

2 said stress concentration comprises a notch cut into said reinforcing sleeve intersecting
3 said open end of said reinforcing sleeve.

1 5. The seat belt device of claim 1, wherein:

2 said reinforcing sleeve comprises a fabric having a denier of no greater than 1000 x
3 1000.

1 6. The seat belt device of claim 1, wherein:

2 said reinforcing sleeve comprises a fabric having a denier of no greater than 500.

1 7. The seat belt device of claim 1, wherein:

2 said inflatable air bag member comprises a fabric tube that, in an un-inflated condition
3 assumes the shape of a flat belt having a first and a second lateral edge, said fabric tube being
4 folded into a rooster-tail fold comprising a plurality of pleats along said first lateral edge and a
5 single apex along said second lateral edge.

1 8. A seat belt airbag comprising:

2 an inner layer comprising an inflatable air bag member, said inflatable air bag member
3 comprising an elongate tubular member that, in an un-inflated condition assumes the shape of a
4 flat belt having a first and a second lateral edge and a first and a second end, said elongate
5 tubular member tube being folded into a rooster-tail fold comprising a plurality of pleats along
6 said first lateral edge and a single apex along said second lateral edge, said inflatable air bag
7 member being adapted to deploy under an inflation pressure;

8 a middle layer comprising a reinforcing sleeve surrounding said inflatable air bag
9 member and extending from said first end of said inflatable air bag member to a point medial
10 of said first and second ends of said inflatable air bag member, said middle layer comprising a
11 flexible fabric tube having sufficient strength to contain said inflatable air bag member under
12 said inflation pressure; and

13 an outer layer comprising a flexible fabric tube surrounding said inflatable air bag
14 member and said reinforcing sleeve, said outer layer having a longitudinal weakened seam
15 such that said outer layer is incapable of containing said inflatable air bag member under said
16 inflation pressure.

1 9. The seat belt device of claim 8, wherein:

2 said reinforcing sleeve comprises a stress concentration at said open end, said stress
3 concentration being capable of initiating a tear in said reinforcing sleeve that propagates
4 toward said eyelet as said inflatable air bag is inflated.

1 10. The seat belt device of claim 9, wherein:

2 said stress concentration comprises a notch cut into said reinforcing sleeve intersecting
3 said open end of said reinforcing sleeve.

1 11. The seat belt device of claim 8, wherein:

2 said reinforcing sleeve comprises a fabric having a denier of no greater than 1000 x
3 1000.

1 12. The seat belt device of claim 8, wherein:

2 said reinforcing sleeve comprises a fabric having a denier of no greater than 500.